HPC-AI-Report2

December 4, 2024

1 UM6P hackathon report (part 2)

1.1 TajTech

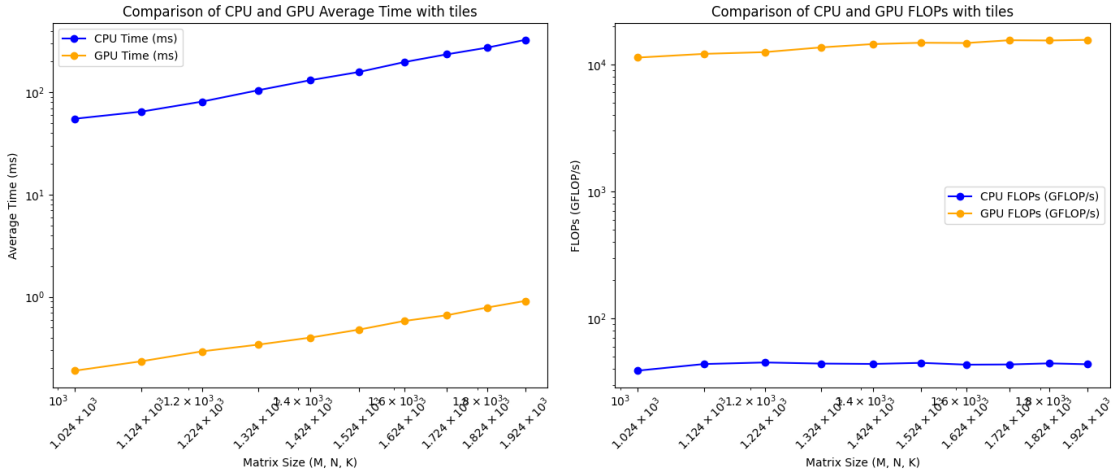
1.1.1 Mundiapolis

[1]:
```
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```

```
/home/abdennacer/.local/lib/python3.10/site-
packages/matplotlib/projections/__init__.py:63: UserWarning: Unable to import
Axes3D. This may be due to multiple versions of Matplotlib being installed (e.g.
as a system package and as a pip package). As a result, the 3D projection is not
available.
  warnings.warn("Unable to import Axes3D. This may be due to multiple versions
of "
```

[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt

# Load the new CSV data
file_path = 'gemmtotask3.csv'
data = pd.read_csv(file_path)

# Extract the relevant columns
matrix_sizes = data['M']
cpu_times = data['AverageTimeCPU(ms)']
gpu_times = data['AverageTimeGPU(ms)']
cpu_flops = data['PerformanceCPU(GFLOP/s)']
gpu_flops = data['PerformanceGPU(GFLOP/s)']

# Create the figure and subplots
fig, ax = plt.subplots(1, 2, figsize=(14, 6))

# Plot CPU vs GPU average times on the first subplot with log scale
ax[0].plot(matrix_sizes, cpu_times, label='CPU Time (ms)', color='blue',␣
 ↪marker='o')
```

```
ax[0].plot(matrix_sizes, gpu_times, label='GPU Time (ms)', color='orange',␣
 ↪marker='o')
ax[0].set_title('Comparison of CPU and GPU Average Time with tiles',␣
 ↪fontsize=12)
ax[0].set_xlabel('Matrix Size (M, N, K)', fontsize=10)
ax[0].set_ylabel('Average Time (ms)', fontsize=10)
ax[0].set_xscale('log')
ax[0].set_yscale('log')
ax[0].set_xticks(matrix_sizes)  # Ensure proper scaling on x-axis
ax[0].tick_params(axis='x', rotation=45)  # Rotate x-axis labels by 45 degrees
ax[0].legend()

# Plot CPU vs GPU FLOPs on the second subplot with log scale
ax[1].plot(matrix_sizes, cpu_flops, label='CPU FLOPs (GFLOP/s)', color='blue',␣
 ↪marker='o')
ax[1].plot(matrix_sizes, gpu_flops, label='GPU FLOPs (GFLOP/s)',␣
 ↪color='orange', marker='o')
ax[1].set_title('Comparison of CPU and GPU FLOPs with tiles', fontsize=12)
ax[1].set_xlabel('Matrix Size (M, N, K)', fontsize=10)
ax[1].set_ylabel('FLOPs (GFLOP/s)', fontsize=10)
ax[1].set_xscale('log')
ax[1].set_yscale('log')
ax[1].set_xticks(matrix_sizes)  # Ensure proper scaling on x-axis
ax[1].tick_params(axis='x', rotation=45)  # Rotate x-axis labels by 45 degrees
ax[1].legend()

# Adjust layout for better spacing
plt.tight_layout()

# Show the plot
plt.show()
```



[ ]:
```
import pandas as pd
import plotly.express as px

# Load the CSV file into a DataFrame
df = pd.read_csv('gemmTileBatchTests.csv')

# Create a new column 'Matrix Size' by combining M, N, K
df['Matrix Size'] = df['M'].astype(str) + 'x' + df['N'].astype(str) + 'x' +␣
 ↪df['K'].astype(str)

# Plot 1: TimeGPU vs Matrix Size
fig1 = px.line(df, x='Matrix Size', y='TimeGPU(ms)',
               title='GPU Time vs Matrix Size',
               labels={'Matrix Size': 'Matrix Size', 'TimeGPU(ms)': 'TimeGPU␣
 ↪(ms)'})
fig1.show()

# Plot 2: PerformanceGPU vs Matrix Size
fig2 = px.line(df, x='Matrix Size', y='PerformanceGPU(GFLOP/s)',
               title='GPU Performance vs Matrix Size',
               labels={'Matrix Size': 'Matrix Size', 'PerformanceGPU(GFLOP/s)':␣
 ↪'PerformanceGPU (GFLOP/s)'})
fig2.show()
```

[ ]:
```
import pandas as pd
import plotly.express as px

# Load the fixed matrix size CSV file into a DataFrame
df = pd.read_csv('gemmTileBatchTestsFixedMNK.csv')

# Create a new column 'Tile Size' by combining tileM and tileN
df['Tile Size'] = df['tileM'].astype(str) + 'x' + df['tileN'].astype(str)

# Plot 1: TimeGPU vs Tile Size
fig1 = px.line(df, x='Tile Size', y='TimeGPU(ms)',
               title='GPU Time vs Tile Size',
               labels={'Tile Size': 'Tile Size (tileM x tileN)', 'TimeGPU(ms)':␣
 ↪'TimeGPU (ms)'})
fig1.show()

# Plot 2: PerformanceGPU vs Tile Size
fig2 = px.line(df, x='Tile Size', y='PerformanceGPU(GFLOP/s)',
               title='GPU Performance vs Tile Size',
               labels={'Tile Size': 'Tile Size (tileM x tileN)',␣
 ↪'PerformanceGPU(GFLOP/s)': 'PerformanceGPU (GFLOP/s)'})
```

```
fig2.show()
```

[ ]:
```
import pandas as pd
import plotly.express as px

# Load the CSV file into a DataFrame
df = pd.read_csv('gemmTileBatch_PerformanceByBatchcount.csv')

# Plot 1: TimeGPU vs BatchCount
fig1 = px.line(df, x='BatchCount', y='TimeGPU(ms)',
               title='GPU Time vs BatchCount',
               labels={'BatchCount': 'Batch Size', 'TimeGPU(ms)': 'TimeGPU␣
 ↪(ms)'})
fig1.show()

# Plot 2: PerformanceGPU vs BatchCount
fig2 = px.line(df, x='BatchCount', y='PerformanceGPU(GFLOP/s)',
               title='GPU Performance vs BatchCount',
               labels={'BatchCount': 'Batch Size', 'PerformanceGPU(GFLOP/s)':␣
 ↪'PerformanceGPU (GFLOP/s)'})
fig2.show()
```

[ ]:
```

```